UNITED STATES DISTRICT COURT FOR THE
EASTERN DISTRICT OF NEW YORK

BARBARA SCHWAB, et al., Individually and on Behalf of All Others Similarly Situated, Plaintiffs, v. PHILIP MORRIS USA, INC., et al., Defendants.	Civil Action No. 04-1945 (JBW)

SUMMARY OF EXPERT OPINIONS OF
<u>WAYNE S. DESARBO</u>

SUMMARY OF THE EXPERT OPINIONS OF DR. WAYNE S. DESARBO

I am the Mary Jean and Frank P. Smeal Distinguished Professor of Marketing at the Smeal College of Business at the Pennsylvania State University at University Park, Pa. I have held similar endowed chaired professorships at the Wharton School of the University of Pennsylvania, and the University of Michigan. I received my B.S. degree in Economics from the Wharton School of the University of Pennsylvania and have M.A. degrees in Sociology, Administrative Science/O.R., and Marketing from Yale University and the University of Pennsylvania. I obtained my Ph.D. in Marketing and Statistics from the University of Pennsylvania, and have completed post doctorate work in Operations Research and Econometrics there. I have published over 125 articles in such journals as the Journal of Marketing Research, Psychometrika, Journal of Consumer Research, Journal of Mathematical Psychology, Marketing Science, Journal of Classification, Journal of Marketing, Management Science, and Decision Sciences. My methodological interests lie in multidimensional scaling, classification, and multivariate statistics, especially as they pertain to substantive marketing problems in positioning, market structure, consumer choice, market segmentation, and competitive strategy. I was awarded the 1988 Raymond B. Cattell Award for my research contributions in mathematical psychology, and nominated as President of the Psychometric Society. In addition, I was awarded the University of Michigan Senior Research award for his research performance at the School of Business. I am one of a few Marketing scholars to be selected by the Royal Swedish Academy to serve on the Nobel Prize Nomination Committee. I was the Chair of the Statistics in Marketing

Section of the American Statistical Society. I am a member of AMA, ORSA/TIMS, Psychometric Society, ASA, RSS, Classification Society, INSNA, IMS, Econometric Society, ACR, DSI, SMS, and APA. I serve on the review boards of Marketing Science (Associate Editor), the Journal of Marketing, the Strategic Management Journal, and the Journal of Marketing Research. I have over ten years of work experience in Marketing Research at AT&T and Bell Laboratories, and have been a consultant for such diverse firms as AMERITECH, AT&T, Ad Audit, Pfizer Drug, SENMED, Pacific Bell, General Motors, Hughes Aircraft, GTE, Motorola, Marketing Metrics, Blue Cross, Eli Lilly Co., and Merck Pharmaceuticals. I am CEO and owner of ANALYTIKA Marketing Sciences, Inc. My full resume appears in Exhibit I. My hourly billing rate for this project was $950/hour.

SUMMARY OF MY OPINIONS

I have been hired as an expert to comment on the work performed by Dr. John Hauser on behalf of the plaintiff in this court case. I assume that the data provided to me from the two Hauser studies is accurate and correct in representing the data collected from both studies. My work is ongoing and I may update and/or revise his results and conclusions as I review additional data and information. Based upon my review of the materials and my expertise in Marketing, Statistics, and Psychometrics, I have formed the following opinions, all of which are stated to a reasonable degree of scientific certainty.

I. HAUSER CONJOINT STUDY SUMMARY

Dr. John Hauser of the M.I.T. Sloan School of Management has presented a summary report of the study he and his colleagues at Applied Marketing Sciences, Inc. performed on behalf of the Plaintiff. The objective of this study, according to this document, was "to assess the value and importance of health risks to 'light' cigarette consumers in their decision to purchase a 'light' cigarette" (p.4). The proposed methodology utilized to design, execute, and analyze the study results were described by the author to be "sound, reliable, and valid" (p.5). As stated by the author "the results can be relied upon to draw inferences about whether health risks are a significant contributing factor in consumer decisions to smoke 'light' cigarettes and what proportion of 'light' cigarette-smoking consumers relied on health risks as a significant factor" (p.5). After modest interviewing and pre-testing, a consumer survey was designed involving conjoint analysis, and potential respondents were randomly selected from the Greenfield Online database and sent an invitation to complete the survey online. A $5 incentive was offered (added to their prize account) for all respondents who qualified and completed the survey. The survey was conducted from 6/15/05 to 6/29/05 and a total of 627 respondents completed the survey. Quotas were established so that the final sample would closely match the national data on Census region, sex, age, and household income (some 72 quota groups). The net response rate was 14.9% (p.13). The primary aspect of the survey was the choice based conjoint analysis portion where a series of 16 choice sets (screen shots) containing four hypothetical alternative cigarette options which may or may not currently exist in the marketplace. They were told to select one as their

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primary cigarette if these four were the only ones available. Each option was defined with respect to four designated features and associated levels:

1. Pack type (soft vs. hard pack);

2. Level of perceived health risks (greater than regular cigarettes, same as regular cigarettes, same as ultra-light cigarettes, less than ultra light cigarettes);

3. Taste (tastes like a regular cigarette, tastes like your brand of light cigarette, tastes like an ultra light cigarette);

4. Price (50% less than what you now pay, 20% less than what you now pay, same as what you now pay, 20% more than what you now pay, 50% more than what you now pay).

Hierarchical Bayes (HB) choice-based conjoint analysis was applied from software by Sawtooth Software to estimate individual level part-worth estimates indicating the relative importance between the different levels of each of the factors, as well as subsequent analyses to calculate the comparative importance of each factor. Tests confirmed that the Bayesian procedure performed much better than a maximum likelihood aggregate MNL (multinomial logit) model indicating the presence of heterogeneity with respect to this sample of light smokers. The derived HB part-worths were then utilized in subsequent simulations and various calculations examining pricing trade-offs between perceived health risks.

II.   CRITIQUE OF THE HAUSER CONJOINT STUDY

A. Potential Sampling Bias

In any survey, including those involving conjoint analysis, it is essential that the survey sample selected be representative of the population of interest. In order for the survey results to be generalizable to a larger target population, the researcher must demonstrate (among other things) that the survey sample is truly representative of that target population with respect to relevant characteristics, attitudes, behaviors, etc. of interest. This important issue has not been properly addressed in the Hauser conjoint study. In this study, there was no evidence provided to conclude that the sample selected was representative of the population of light cigarette smokers. Part of the difficulty encountered here was that Dr. Hauser's sample was derived instead from an existing pool of people who enrolled to participate in internet based surveys.

The Greenfield Online Database/Panel utilized by Dr. Hauser is restricted to consumers that have internet access and volunteer to participate in such studies. According to the Greenfield web site, internet access is estimated at approximately 75% of the population. Thus, 25% of the population is not reachable with use of such a panel. Such statistics regarding the accessibility of the internet to smokers of light cigarette brands is not available. Thus, all estimates derived from such restricted sampling may be biased, and Dr. Hauser has not demonstrated that this potential bias is insignificant.

In addition, there may be additional bias introduced as a function of respondents' willingness to participate in this study. Of the 52,402 invitations sent out to panel members, 44,159 refused to participate. That is, 84.3% of this sample refused to participate in this survey and that fact may lead to selection bias despite the efforts made

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for re-contact; only15.7% agreed to participate. Dr. Hauser fails to demonstrate whether this 15.7% is representative of the target population of light cigarette brand smokers.

Consumer panels are often utilized in Marketing as a convenient manner to collect information from consumers. Care, however, must be given to ensure that such panels are representative of the behaviors, characteristics, attitudes, etc. of the target population of interest. Given that the Greenfield panel consists of professional survey takers, it is unknown how representative they are of the total population of light cigarette brand smokers. Dr. Hauser has not demonstrated that the light cigarette brand smokers participating in this panel are truly reflective of the various smoking behaviors, attitudes, preferences, perceptions, feature importance salience, etc. of the true population of light cigarette brand smokers. No evidence of this important aspect has been provided in this Hauser report.

These three major issues concerning the representativeness of this panel affect the generalizability of the results of this study to the national population of light cigarette brand smokers. Dr. Hauser has thus failed to demonstrate that the conjoint analysis results derived from this survey can be scientifically generalized to a national class of light cigarette brand smokers. Still other problems exist along these same lines as described below.

B. Quota Sampling Difficulties

As mentioned in the summary statement in the first portion of this report, the Hauser study utilized a quota sampling procedure in an attempt to match the national demographics of the *entire population* with respect to age, gender, income, and geographical region. However, even assuming demographics are the appropriate basis for

a stratification of the entire national population, the matching process should have been done with respect to the national demographics of light cigarette brand smokers, which Dr. Hauser failed to do (see footnote 12 on p. 13 of his report which admits to this potential distortion). Exhibit II displays the discrepancies between the sample characteristics (marginal distributions of the four demographic quota variables) of the respondents of this study in comparison with the U.S. population characteristics (U.S. Census Bureau) and that of light smokers as taken by the 2002 NCS (National Consumer Survey) study. Chi-Square tests were performed for each of these four demographic variables to examine whether the Hauser distributions were statistically the same as the US population (from the US Census data) and the NCS national study for light cigarette brand smokers. As shown in Exhibit II, with the sole exception of gender in the NCS study, the Hauser sample deviates significantly from **both** distributions for **every other** demographic quota variable ($p \le 0.01$). In addition, there are significant differences between the distributions for these four demographic variables between the US population (census data) and the NCS light cigarette smoker data indicating the fact that light cigarette brand smokers do differ demographically from the overall US population characteristics. Given the discrepancies here between the three distributions, it is not clear which population the Hauser study can be properly generalized to. As such, Dr. Hauser has not demonstrated that his conjoint analysis survey sample is representative of the class of light cigarette brand smokers or that his results can be scientifically generalized to this same class.

The use of these demographic variables as a basis of setting sample quotas is also questionable in this particular application. Ideally, one selects consumer characteristics

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that are relevant to the aims and objectives of the study. Without prior extensive consumer theory or empirical evidence, one has to demonstrate the connection here between demographics and the preferences, behaviors, and decisions that light cigarette brand smokers make, which Dr. Hauser has failed to do. The use of demographic information is convenient, but may not be very much related to the purchase behaviors and various decisions of light cigarette brand smokers. For example, we can explore the impact of these four demographic characteristics on the derived conjoint importances that were computed for pack, taste, health risks, and price to investigate the strength of their relationships. As shown in Exhibit III's MANOVA analysis, these demographics, while significant in saturated model form for three of the four importance measures, have very little impact in fully explaining the derived importance of these four conjoint factors in light cigarette brand smokers, accounting for between only 11-17% of the total variation in these importances across the population with the saturated model including all main effects and interaction terms (the adjusted R-squares range from 0 - 0.064 which are all trivial in magnitude).   None of the main effects are uniformly significant at $p \leq 0.05$. Thus, the four demographic characteristics utilized by Dr. Hauser as a basis for the selection of his sample have little relevance to the purpose of this study.

In addition, although the potential respondents were selected at random from the Greenfield Online database to match the 72 demographic cells of the national average, the respondents were screened via quota sampling so that once any particular cell was filled, no further respondents who matched that description would be allowed. While efficient, the net result is **not** a probability sample per se, and thus one can not calculate confidence or precision statements about the sample estimates that would generalize to

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the entire national population, and much less to the national population of light cigarette smokers (cf. Green, 1988).   In sum, the *external validity* of this study is highly questionable given the sampling issues raised in sections A and B above.

Finally, there is other important demographic information (cf., Carter and Silverman, 2004) that was not utilized by Dr. Hauser in setting quota levels for the sample in this particular study. For example, ethnicity, occupation, and employment status were not utilized in the sampling frame of this study and are demographic characteristics which may have more significant relationships with aspects relating to light cigarette brand purchase than do many of the demographic characteristics utilized in Dr. Hauser's study. In fact, an auxiliary data file suggests that ethnicity, occupation, and employment status for a subset of these 627 respondents were evidently measured by Hauser. Given the vast amount of missing responses per variable, a fully saturated MANOVA is not possible to estimate. However, in looking at the relationship between these three variables and the four derived importance measures investigated previously via MANOVA, we see higher R-square fits than we witnessed in Exhibit III for three of the four importance measures. Exhibit IV presents the MANOVA results estimated with these three factors. Two of the four models are significant, but the corresponding R-square (ranges from 0.440 – 0.631) and adjusted R-square values (ranges from -0.079 – 0.440) are higher on average than the four demographics utilized for the sampling quotas. Thus, it can be legitimately argued that the sampling selection criteria utilized was incomplete and should have included additional demographic characteristics that together could explain more of behavioral phenomena or derived estimates.

In fact, given that such quotas were not set on these other factors, Exhibit V

demonstrates that the resulting sample does not generalize to either the complete US

population or the light cigarette brand smoking population with respect to two of these

three other demographic factors for which we could align response categories (we could

not match up the occupational categories for the three studies, given the drastically

different response scales utilized). Thus, the Hauser sample is strongly biased and is not

representative of either the US population nor the NCS light cigarette smoker sample.

C. Measurement Issues

The decision to smoke cigarettes is a complicated process and involves a series of

decisions whose sequence may differ depending upon the individual. Smokers confront

several decisions, including the type of cigarettes, brand, and consumption level. Such

nested decisions most likely depend upon different factors such as family

history/acceptance, peer pressure, health concerns, taste, price, life stress, the relevance

of the brand image of those brands in the smoker's consideration set, etc., and the

sequence might vary upon the individual. One major problem associated with the Hauser

study is that it has nothing to do with these specific real-world. Nowhere in the study is

there any explanation for these types of decisions. Indeed, it appears that the primary

objective of the study listed on page 4 of the Hauser report is not suitably addressed by

this study, and there is a serious problem with the *internal validity* of the study. Smokers

do not purchase light cigarette brands in real life in an artificial manner on a computer

screen given these profile descriptions of these sole four product attributes.

More importantly, this study does not show reliance or conformity with respect to

smokers' beliefs when they purchase light cigarette brands. That is, the study does not, in

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any form, address any issues of smokers being misled about purchasing light cigarette brands, and this study's relevance to this case is questionable at best. Interestingly, a second study conducted by Dr. Hauser with an alternative sample of light cigarette smokers which was not mentioned in the report, does tangentially deal with this issue of smoker beliefs. Exhibit VI displays simple frequency distributions for the wording and responses to questions 8, 9, 10, and 11. **Almost 80% of the respondents currently believe that light cigarettes have the same or more health risks as regular cigarettes. Of these, almost two-thirds have always held that belief.** This is certainly not supportive of any reasonable claim of reliance on misleading information, as suggested by the plaintiff.

D. Mis-specification Errors

There are several product attributes that are important to smokers (cf. Carter and Silverman, 2004) that were omitted from this survey in the conjoint analysis. And many of these additional product attributes were evidently mentioned by respondents in the qualitative interviews conducted prior to this conjoint study. Most importantly, brand of cigarette was not included in the study. This is a serious deletion in light of the fact that each light cigarette brand has its own image, and given the fact that different smokers may be attracted to different aspects of a given brand's equity, including price, packaging, image, flavor, consistency, quality, or use by family and friends. Other potentially important missing product attributes include the length of the cigarette, the type of filter, tar/nicotine content, flavor enhancements (e.g., menthol), etc. Dr. Hauser states that the use of the particular error distribution protects one against mis-specification errors as they would be accommodated by an error term. This is only true if

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such missing product attributes do not interact with the attributes included in the design.

There is no information/evidence provided in the study that such missing attributes are

insignificant or do not confound the results derived. In addition, from an inspection of the

model structure, no interactions were estimated in the model or accommodated in the

design outside of a two-way interaction with price. Dr. Hauser claims that one can

discern such interactions on the basis of interviews with smokers. I fully disagree with

this statement as the only concrete way to examine such interactions is to utilize

experimental designs which permit their estimation and actually empirically estimate and

test them in the model itself. Failure to do so explicitly makes the main effects reported in

this report highly suspect, as main effects are often confounded with higher order

interactions and thus are often meaningless to talk about, especially with cross-over type

interactions. As such, the part-worths estimated and reported, as well as the factor

importances and calculations, are all suspect.

E. Perceptual Ambiguity

In the Hauser conjoint study, respondents were presented choice sets of hypothetical

light cigarettes defined with respect to specific levels of pack type, price, taste, and health

risk. While the levels of the pack type are concrete and easy for all respondents to

comprehend, there are potentially serious problems associated with a common

understanding of the levels of the remaining three factors utilized in the conjoint analysis.

For example, with respect to health risks, it is not clear how each respondent processes

and interprets the different levels of health risks associated with regular, light, and ultra-

light cigarettes, i.e., exactly what health risks are in the mind of each smoker at this time.

Dr. Hauser's study does not accommodate differing perceptions of specific health risks.

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There may be no uniformity of beliefs here despite the national press on this topic. Also, there may not be uniformity with respect to respondents' perceptions of the health risks associated with these different cigarette forms across the sample. Some may believe that all cigarettes are unsafe as is now advertised heavily on television. Others may assume an implicit order of safety related to the amount of tar/nicotine in the cigarette. Because perceptions may vary, the part-worth numbers estimated per respondent may not be comparable.

This same argument can be made regarding the levels tested for taste. Taste for these different cigarette forms can vary substantially depending upon the brand (brand specific additives and/or tobacco in the blend) and tar content. Furthermore, a respondent cannot reliably assume a level of taste based on assumptions of a regular or ultra-light cigarette in a computer exercise. In addition, there are individual differences and experiences with respect to perceptions and beliefs on taste. Taste is a multidimensional concept and relates to various characteristics about the cigarette related to the type of tobacco utilized, tar/nicotine content, flavor additives such as menthol, ventilation, and tobacco blend , and flavoring. It is virtually impossible for a respondent to reliably assess the taste of any other cigarette outside of the particular brands s/he has consumed. Evidence of this perceptual ambiguity can be derived from the results of Hauser's own study. Exhibit VII shows various descriptive statistics on comparative perceived health risks and tastes between cigarette forms from the survey. Note the huge range (0-150) associated with each of these four questions, as well as the large variances. Such large ranges and variances here support the contention of a lack of uniform or consistent perceptions with respect to health risks and taste.

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There are similar problems of potential perceptual ambiguity associated with price. Not everyone pays the same price for a pack of the same brand of cigarettes as there are rather dramatic differences in state associated taxes (e.g., compare the taxes on a pack of cigarettes for VA vs. NJ). Also, the price of the pack often depends on the brand smoked. Again, a particular level of any one of these levels may mean different things to different smokers given their experiences. Thus, the specific percentages (50%, 20%) tested more/less than what the respondent currently pays imply different amounts to different respondents.

Also, the fact that many of the conjoint questions were asked in relationship to the smoker's experience with their current brand of light cigarette is problematic. Different smokers have different experiences and beliefs about their own brands of cigarette, and these were not dealt with appropriately in this study. The benchmark smokers utilized therefore differs across the board with respect to using their current brand as a referent point. As such, it is problematic that Dr. Hauser treats the derived estimates as unconditional (comparable) over different respondents.

Finally, there are other potential problems associated with the various product attribute levels tested in the conjoint analysis. Researchers in the field have documented the existence of a "levels effect" in conjoint analysis where factors employing more levels tend to be higher in significance in the estimation (Steenkamp & Wittink, 1994;Verlegh & Wittink , 2002; Wittink, Krishnamurti, & Reibstein, 1989). In fact, noting that price, health, taste, and pack were tested with 5,4,3, and 2 levels respectively, it is not surprising that the order of importance also follows that same ordering. No controls were placed over this "levels effect" by Dr. Hauser. It is therefore likely that the

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particular design of the experiment itself had a direct impact concerning the end result/findings with respect to the order and magnitudes of levels tested for the four product attributes.

F. Experimental Problems

There are several problems associated with respect to the constructed hypothetical product choice sets and assumptions utilized in this conjoint analysis. First, the smoker was told explicitly in the instructions to the conjoint analysis to assume that these four product attributes are independent, and each attribute level does not affect any other. This is problematic in reality when it is known that taste is affected by tar content, which also affects health risks. Two, many of the hypothetical products are infeasible in that nothing in the marketplace even approximates such hypothetical choices. For example, it may not be possible to attain a pack of cigarettes 50% more or less than what the smoker now pays. While one often creates product choice sets in conjoint studies which stretch the actual brands in the market place in terms of attribute levels, a wide discrepancy may not be believable in practice and may provide unreliable responses. In addition, using artificially inflated levels of factors (e.g., price) may lead to having that particular factor end up becoming more important in the end result. Third, the respondents are asked to make several assumptions which may run counter to their own perceptions or what is known in the marketplace at the time of this study. As mentioned above, respondents were asked to assume that taste and health risks were independent, which they are not. The levels of the health risk factor appear ordered or at least different, when in fact all such forms of cigarettes are not safe. The effect may be to lead the respondent and inflate the overall importance of health risks in this study. Since there was no tactile sampling of

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taste with actual prototype cigarettes, the smokers were told to assume various perceptual levels of taste in comparison to either their own brand of light cigarette or what they thought a regular or ultra-light brand of cigarette would be like. Serious problems occur here since different brands taste different, and the perceptual benchmarks each respondent has in mind in response to this particular aspect is likely to be quite different. As such, the derived importances and part-worths estimated here are not comparable across respondents, and this analysis should have been performed within each individual respondent separately. More on this important area will follow later in the technical issues section.

G. Lack of Predictive Validation with Respect to the Actual Market

One of the most useful features associated with conjoint analyses is the ability to validate the workings of the model in predicting the actual market shares of existing brands in the market place. In fact, this is one of the advantages of using a CBC formulation since such share predictions come right out of the model itself as opposed to having to apply an intermediate step with a separate choice/share model. Because of the problems associated with potential mis-specification/lack of factors such as brand, cigarette length, type of filter, tar/nicotine content, etc., as well as the perceptual distortion issues raised with respect to differential individual perceptions of the various factor levels utilized in this conjoint analysis, validation of the actual brands' share in the market place is not feasible in the Hauser study. And if attempted, the results would be grossly inaccurate in many cases given the large market share differences (brand identity/equity) associated with different brands in the light cigarette market. For example, without using brand name in such model predictions, one would be at a loss in

attempting to account for share differences observed between, for example, two brands of light cigarettes that were identically priced, had hard packs, possessed the same health risks, and tasted the same, but had drastically different market shares in the market (e.g., take Marlboro, the market share leader, with another similar cigarette brand). The inability to perform this predictive validation with real market light cigarette brands is a severe limitation and raises serious questions as to the usability of the results of this study. Using a hold-out sample of choice sets for predictive testing, as Dr. Hauser did, does not provide the same confidence in the performance of the model as does validating real market behavior. The study misses an essential aspect of the cigarette market regarding the actual consumer perception of real market brands of light cigarettes which should have been a key aspect of any study of this form.

H. Technical Problems

The various technical problems identified below are those where Dr. Hauser's overall research design and analysis of the resulting data do not meet accepted practice in the field of Statistics. First, the respondent is not allowed to be indifferent in the Hauser study and is forced to make a choice in each of these choice sets. In addition, there is not a "No Choice" option in case all options are dispreferred. This does not reflect reality and can therefore bias the results. Forcing a choice for situations involving "equally dispreferred" hypothetical brands will affect the analysis and resulting parameter estimates. The vast majority of CBC studies contain a No-Choice option for this reason (cf. Louviere, Hensher, Swait, and Adamowicz , 2000).

Second, Hierarchical Bayes procedures have been criticized over the parametric assumptions made with respect to the prior and/or hyper prior distributional assumptions

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made. As such, researchers attempt to demonstrate robustness to such assumptions by utilizing different prior assumptions and seeing how much the results change. Such sensitivity analysis has become commonplace to all applied Bayesian work. Yet, such analyses were not included in the Hauser report, thus deviating from standard statistical practice. It is important to demonstrate that one's prior assumptions do not dramatically influence the results. Even if non-informative hyper-priors are utilized, these distributions follow a certain shape with characteristics about the first four moments of the distribution (mean, variance, skewness, kurtosis) which typically affect the results obtained.

Third, most researchers examine residuals in their models to examine if there are structural problems observed with respect to parametric assumptions, the presence of outliers, missing explanatory variables in the model, etc. This was also not performed in the present study and there is no confirmation of the viability of the model employed here. Hauser states that the U^2 figure reported ranges from 0 to 1 as a measure of fit (the closer to 1.0, the better). The reported average fits were 0.52 for the calibration profile choices and 0.459 for the holdout profiles (p.18). Interpreting this as Dr. Hauser does as a "percentage of uncertainty explained by the model" (p.17), you have roughly half of the information in these choice sets **unexplained** by the Hauser HB model. This other 48-54% is unexplained and we cannot be assured that the calculations derived from the estimates of this model are valid when we see such questionable fit values.

Fourth, the HB CBC methodology estimates individual level part-worth utilities and thus factor importances. Dr. Hauser demonstrates that the HB CBC methodology outperforms the aggregate MNL conjoint model which assumes one common set of estimates for the entire sample. These attribute importances for the four conjoint product

attributes from the HB CBC analysis are plotted in Exhibit VIII via box plots to demonstrate an important point to be made. As shown in the figure, the interquartile range for the taste and health risk factors overlap substantially. For a sizable percentage of respondents, taste is actually more important than health risk. This heterogeneity amongst respondents means that not all respondents are alike and that there is no typicality or uniform thought present in this marketplace.

Fifth, Hierarchical Bayesian methods offer the advantage of deriving individual level estimates of model parameters with relatively sparse data. This procedure pools over all the respondents in the various calculations involved in the MCMC algorithm. However, as mentioned earlier, if the data is not comparable over all respondents, then there is a problem with the application of this procedure. In particular, if the respondents are each utilizing different perceptual beliefs and benchmarks in interpreting the various conjoint factor levels provided in the various choice sets, then the analysis needs to be conducted on an individual by individual level – an aspect that cannot be accommodated with the choice set designs utilized in this study (especially incorporating a saturated interaction model).

III.   CONCLUSIONS

My professional assessment of the Hauser study is that it is fraught with a variety of problems discussed above and that the results are virtually meaningless in the context of describing the actual decision/choice processes engaged by light cigarette brand smokers. The conjoint task is unrealistic, not reflective of how actual smokers make decisions concerning light cigarette brands, and conducted in an artificial setting. The real

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world decisions faced by smokers of light cigarette brands in the purchase and consumption of light cigarette brands have not been investigated in this study. Important product attributes deemed essential to various decisions concerning light cigarette brands have been ignored. The sample selected for use is biased, non-representative, and the results of this survey study cannot be generalized to the population of light cigarette brand smokers within prescribed confidence and precision limits. Serious methodological problems potentially exist with respect to a uniform understanding by respondents of the levels of the product attributes tested, as well as the number and extreme ranges of the levels of some of the attributes employed in the study which could seriously affect the results. As such, the external and internal validity of this work is highly questionable. Modeling assumptions have not been adequately tested and verified, nor has proper sensitivity analysis of the results to different assumptions been performed. There has not been any appropriate addressing of issues concerning reliance, conformity, or causation in this study, especially given the massive amount of heterogeneity amongst these smokers. What little work there has been on reliance/conformance occurs in Study #2 which is not mentioned in the Hauser report.

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Signature

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5/24/06
Date

Sworn to and subscribed before me this 24 day of May 2006

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Dana A. Lonjin, Notary Public
State College Boro, Centre County
My Commission Expires Jan. 19, 2010
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